

below the normal; brisk to high southwest winds were reported at Sidney, Cape Breton Island, and at Bird Rock. The maximum temperatures of the month, in the Mississippi valley and at stations in the northern part of the upper lake region, occurred in connection with the passage of this area.

VII.—This was a slight disturbance which appeared in Manitoba on the 22d; it moved east-southeastward during the day, and at the morning report of the 23d, the lowest recorded barometer readings were 29.81 at Mackinaw City, Michigan, and 29.83 at Parry Sound, Ontario, these values being .22 and .20 below the normal, respectively. By the afternoon report of the 23d, the pressure had decreased to 29.70 at Rockliffe, Ontario, and high winds to gales occurred in the lower lake region, with light to heavy rains at the northern stations. The disturbance moved down the Saint Lawrence valley, and as the winds shifted to northwest and west in the lower lake region, they attained a velocity ranging from twenty-five to thirty-three miles an hour at stations on Lakes Huron, Erie, and Ontario. On the morning of the 24th the disturbance reached the mouth of the Saint Lawrence, and passed over the Gulf.

VIII.—The afternoon reports of the 23d showed a considerable decrease of pressure in the region north of Montana; at the midnight report the barometer at Medicine Hat read 29.37, while the pressure in northern Montana and northwestern Dakota was more than .20 below the normal. On the morning of the 24th the lowest barometer readings were reported from northern Dakota and the Saskatchewan valley, where the pressure was 29.52 to 29.62, or about .30 below the normal. The low area moved eastward north of the United States, and on the 25th it occupied the Lake Superior region; it then moved in a course slightly south of east over the northern part of the lake region, giving rainy weather in both the upper and lower lake regions, with high south and southwest winds to gales in the former and brisk to high winds in the latter district. The pressure increased as the disturbance moved along the Saint Lawrence valley during the 26th causing showery weather in that district. By the morning of the 27th the depression had passed to the northward of Anticosti Island.

IX.—This area appeared in the Saskatchewan valley on the 28th, with a subsidiary depression in Minnesota. During the day the principal depression moved east-southeastward, and was over Lake Superior on the morning of the 29th, the pressure at Duluth, Minnesota, being 29.60, or .42 below normal; at the afternoon report the centre of this depression was in western Ontario, while another disturbance, which had moved up from the Ohio valley, was central over Lake Huron. During the day the two disturbances probably united and, together with low area xi., passed as an extensive depression along the Saint Lawrence valley at the close of the month.

X.—This disturbance apparently developed in the Ohio valley on the 28th; at the afternoon report of that date the barometer at Columbus, Ohio, had fallen to 29.70, or .30 below normal, and light rain had been falling at stations in the Ohio valley and in the southern part of the lower lake region since the morning report. At midnight the minimum pressure was reported from Port Huron, where the barometer read 29.59, or .41 below the normal; rainy weather continued at the lake stations, and at Buffalo the wind reached a velocity of twenty-six miles an hour from southeast. On the morning of the 29th the storm-centre was near Toronto, Ontario; at that station the barometer read 29.55, or .48 below normal; rain continued to fall at stations near the centre, and cloudy weather with occasional rains prevailed in the middle Atlantic states. At the afternoon report of the 29th the depression still occupied Ontario, the pressure at stations in that province ranging from 29.54 to 29.60. Brisk to high southwest winds occurred at stations on Lake Ontario, and the rain area extended to New England. At midnight the disturbance was passing northeastward over the Saint Lawrence valley, causing rainy weather in that district, while a secondary depression had

appeared over Lake Huron. Severe local storms occurred in Illinois, Indiana, and northern Kentucky during the passage of this disturbance.

XI.—This disturbance, which was probably a secondary development of low areas ix. and x., appeared over Lake Huron, at midnight of the 29th; at that report the barometer at Port Huron read 29.59, or .41 below the normal. On the morning of the 30th, the storm-centre was apparently over the northern part of the lake, the minimum pressures being 29.53 at Alpena, Michigan, and 29.55 at Saugeen, Ontario, or about .45 below the normal. At the afternoon report of the 30th, the barometer at Rockliffe, Ontario, read 29.46, or .49 below normal; high westerly winds to gales prevailed at stations on Lakes Huron, Erie, and Ontario, with rainy weather at the northern stations. During the 31st the disturbance moved northeastward causing light rains in New England and along the Saint Lawrence valley, and followed by clearing weather in the lake region.

NORTH ATLANTIC STORMS DURING AUGUST, 1884.

[Pressure expressed in inches and in millimetres; wind-force by scale of 0—10]

The paths of the atmospheric depressions that have appeared in the north Atlantic ocean during the month have been approximately determined from reports of observations furnished by agents and captains of ocean steamships and sailing vessels, and from other miscellaneous data received at this office up to September 20, 1884.

The observations used are in general simultaneous, being taken each day at 7 a. m. Washington, or 12h. 5m. p. m. Greenwich, mean time.

The month of August has been marked by an absence of severe storms; at the present writing no reports of vessels having encountered tropical or sub-tropical hurricanes during this month have been received at this office.

The paths of ten depressions are shown on the chart; of these, only one (number 10) has been traced as a continuation of a disturbance which first passed over the North American continent. The remaining depressions, which were ill-defined and unimportant, appear to have developed, for the most part, to the northeastward of the banks of Newfoundland, and have moved northeastward, manifesting little or no storm-energy during their passage.

The disturbances which reached the Gulf of Saint Lawrence from the westward have apparently moved northward beyond the region covered by the reports. This movement appears extremely probable in view of the fact that the depressions which passed over the continent moved to the northward of the usual tracks for August.

The weather over the north Atlantic ocean during the month may be summarized as follows: 1st to 18th, moderate to strong westerly breezes, attaining occasionally the force of a moderate gale; frequent fogs to the westward of W. 45°, weather variable. From the 18th to the close of the month, fresh to strong breezes with occasional gales, winds mostly from sw. to nw. and n.; generally cloudy or rainy weather. In connection with the subject of fog, Captain G. de Kersabiec, commanding the s. s. "Canada," (General Trans-Atlantic Co.), reports as follows: "We had much fog from longitude 35° west of Greenwich to longitude 53° W; sea generally high from Havre to the Banks."

The following are brief descriptions of the depressions charted:

1.—This is a continuation of the depression traced over the Atlantic as number 5 on the chart for July. At the close of that month the disturbance was central near N. 50°, W. 30°, and by August 1st, it had reached N. 51°, W. 20°, the pressure near the centre being below 29.6 (751.8); moderate to fresh nw. gales were reported by vessels on the fiftieth parallel and the westward of 20° W. During the day the depression moved northeastward near the British coasts, causing strong southerly winds and rain over the western districts of the British Isles.

2.—On the morning of the 4th the report of the barkentine "Corisande," D. Thoms, commanding, indicated the presence of a depression near N. 55°, W. 30°. In N. 54° 32', W. 30° 52', the barometer read 29.43 (747.5), being a fall of .44 inch, while the wind shifted from ssw. to n., with rainy, cloudy weather; the wind did not exceed the force of a fresh breeze. On the 5th, the s. s. "State of Georgia," G. Moodie, commanding, reported in N. 54° 3', W. 23° 11', barometer 29.57 (751.1) a decrease of .38 inch since the observation of the 4th; wind ssw., force 5, showery. By the following day the depression had passed beyond the range of the observations.

3.—This depression appeared near N. 53°, W. 25° on the 8th; the reports of the steamships "City of Richmond," "Lessing," "Leerdam," and "British Princess," all between N. 49° and 53°, and W. 20° and 30°, showed a decrease of pressure averaging .25 inch, with cloudy, rainy weather and light to fresh breezes from sse. to nw. On the 9th the region of least pressure was shown near N. 52°, W. 18°, where the barometer ranged from 29.66 (753.4) to 28.8 (756.9), with s. and sw. winds, ranging from the force of a moderate breeze to that of a moderate gale. The disturbance apparently moved northeastward, causing a slight decrease of pressure in the western districts of the British Isles, and on the 10th it was central to the north-westward of Ireland, the pressure having risen to 29.8 (756.9).

4.—This disturbance developed between W. 45° and 35° during the 9th; Captain Thoms, commanding the barkentine "Corisande," near N. 57°, W. 45°, reported: "9th, 9 p. m. Greenwich time, wind sw. suddenly increasing to force 8 and veering to w., with drizzling rain; lowest reading of the barometer 29.54 (750.3). At 1 a. m. of the 10th, the wind suddenly shifted to nw., and slightly increased in force, continuing to blow for about two hours, when the barometer began to rise; the wind gradually abated, and the weather cleared up in N. 51° 37', W. 46° 40'." The s. s. "Venetian," W. H. Trant, commanding, reported: "10th, in N. 49° 35', W. 30° 45', barometer 29.46 (748.3), wind s. by w., force 6, shifting to w. at 1 p. m., and blowing strongly, with confused sea till 11 p. m., when a heavy northerly swell set in, causing the ship to roll heavily." Captain Müller, commanding the bark "Johanne," in about N. 48° 30', W. 25°, reported as follows: "10th, 4 p. m., wind increasing from s. by w.; 6 p. m., blowing a whole gale, with drizzling rain, heavy sea, barometer 29.72 (754.9); 10 p. m., barometer 29.6 (751.8), wind still s. by w., blowing hard, heavy cross sea. After 2 a. m. of the 11th, wind gradually veered, and at 6 a. m., it was s. by w., barometer 29.46 (748.3), wind moderating; 10 a. m., wind wnw., strong gale, heavy cross sea and squally, barometer 29.54 (750.3)." During the 11th, moderate s. winds were reported to the eastward of the twentieth meridian, and by the following day, the depression had moved, with increasing pressure, northeastward.

5.—This disturbance was shown near N. 48° W. 37° on the 13th by the following vessel-reports: s. s. "Republic," P. J. Irving, commanding, in N. 48° 31', W. 34° 20', reported barometer 29.62 (752.3), wind se., force 7, overcast and rainy; s. s. "Edam," J. H. Taat, commanding, in N. 46° 17', W. 36° 16', barometer 29.74 (753.0), wind wsw., force 6; drizzling rain; s. s. "Moravia," O. Petzoldt, commanding, in N. 46° 27', W. 38° 40', barometer 29.53 (750.0) wind w., force 4, covered; s. s. "Hermann," H. Baur, commanding, in N. 48° 41', W. 34° 43', barometer, 29.78 (756.4) wind e. by s., force 5, overcast and hazy; s. s. "Arizona," S. Brooks, commanding, in 49° 22', W. 38° 16', barometer 29.84 (757.9) wind une., force 6, overcast and rainy. Captain Müller, commanding the bark "Johanne" reported as follows: "13th, at noon, Greenwich time, in N. 46° 35', W. 30° 14', wind began to increase in force; 2 p. m., strong s. by e. gale, heavy rain; 6 p. m., lat. 46° 39' N., long. 30° 35' W., wind wore to sw. by w., moderating, barometer 29.65 (753.1). After 10 p. m. the wind backed to ssw., moderate breeze, heavy cross sea; at 4 a. m. on the 14th it fell calm, barometer 29.56 (750.8); 8 a. m. it began to breeze up from the north." In the above reports the decrease of pressure during the twenty-four hours interval between the

observation of the 12th and that of the 13th, ranged from .25 inch to .60 inch. By the 14th the area of least pressure occupied the ocean between N. 48° and 52° and W. 30° and 20°, where the barometer ranged from 29.5 (749.3) to 29.7 (754.4), with variable winds; to the westward of the thirtieth meridian the winds had now shifted to northerly and blew with the force of a moderate gale, and to the eastward of the twentieth meridian they were mostly southerly and moderate in force. On the 15th the disturbance was off the west coast of Ireland, the lowest reported barometer being 29.72 (754.9).

6.—This was a depression which appeared north of the fifty-fifth parallel on the 15th. At the observation of that date the barometer on board the s. s. "Ontario," W. P. Couch commanding, read 29.67 (753.6), being a fall of about .15 inch, wind sw. by w., overcast and hazy, (ship's position, N. 55° 50', W. 34° 15'). During the three succeeding days the disturbance appears to have moved slowly eastward, the reports showing the prevalence of southerly winds and low pressures between W. 20° and 10°.

7.—During the 18th there was a decrease of pressure over the region between N. 45° and 50°, and W. 45° and 35°. On the 19th the lowest barometric readings were reported by the s. s. "Iowa," S. Walters commanding, in N. 50° 26', W. 29° 25', barometer 29.39 (745.5), wind s., force 6, misty; and by the s. s. "Furnessia," J. Hedderwick commanding, in N. 52° 46', W. 30° 50', barometer 29.53 (750.0), wind sse., force 6, showery. By the morning of the 20th the pressure had increased to 29.9 (759.4) and the depression was disappearing from the chart.

8.—This was probably a continuation of the depression traced over the United States and Canada as low area vi. At midnight of the 31st, the disturbance was north of Anticosti Island, and on the morning of the 22d it was to the eastward of the strait of Belle Isle, after which it probably passed northeastward beyond the field of observation.

9.—This was probably identical with the depression traced as low area vii. On the morning of the 24th, the centre was over the northern part of the Gulf of Saint Lawrence, and by the 25th, it had passed northeastward beyond the strait of Belle Isle. On that date the s. s. "Brooklyn," G. S. Dale commanding, reported, in N. 50° 27', W. 58° 16', barometer 29.62 (752.3), rising, wind nw., force 4, clear.

10.—This was a continuation of the disturbance traced over the continent as low area viii. It passed over the Gulf of Saint Lawrence and Newfoundland during the 27th, and its approach was indicated on the 28th, by the falling barometer and change of wind experienced by the s. s. "Brooklyn." On the 28th, that vessel, in N. 55° 19', W. 36° 58', reported, barometer 29.73 (755.1), a fall of about .3 inch, wind se., force 2, drizzling rain; vessels near the fiftieth parallel and between W. 35° and 45° had moderate to strong w. and sw. winds. By the 29th the disturbance had passed to the northward of the "Brooklyn"; in N. 55° 29', W. 28° 44' the barometer read 29.59 (751.6), and the wind had shifted to w., force 5, drizzling rain. The depression continued its easterly movement and at the close of the month it was central to the northward of Scotland.

OCEAN ICE.

Chart i. also exhibits the southern and eastern limits of the region within which icebergs were observed in the north Atlantic ocean during the month of August, 1884. These limits are determined from reports sent to this office by shipmasters, reports furnished through the co-operation of the "New York Herald Weather Service," and from other data published in the "New York Maritime Register."

In August, 1884, the southernmost limit of the ice region was in N. 43° 30', but only three or four isolated bergs were observed south of N. 45°; the eastern limit extended to W. 43° 50'. The reports indicate that the region within which icebergs were most numerous was that between N. 46° and N. 49°, and W. 46° and W. 48°. The strait of Belle Isle continued full of icebergs throughout the month.

As compared with the chart for the preceding month (July) there appears to have been a slight but general drift of icebergs towards the south and east; later newspaper reports, however, indicate an extensive southerly movement of icebergs along the eastern coast of Newfoundland. So far as can be determined from the reports at hand, the region south of N. 45° appears to be comparatively clear of ice.

A comparison with the chart for the corresponding month of last year (1883) shows no material difference in the extent of the ice region, either in its eastern or southern limits. In 1883, as in the present year, only a few isolated bergs were observed south of N. 45°; in the strait of Belle Isle more ice has been reported this year than in the two preceding years; in 1883 the strait was clear of ice.

As regards August, 1882, the limits of the ice region during that month were not shown on the chart, the small area covered by the reports, rendering unnecessary the issue of such chart. No icebergs were reported after August 16, 1882, and those observed prior to that date were between N. 46°, W. 46° and N. 48° W. 48°.

Icebergs were reported during August, 1884, as follows:

3d.—Bark "Republik," in N. 48°, W. 45°, passed a large iceberg.

5th.—Bark "Orpheus," in N. 48° 20', W. 44° 40' passed two large icebergs; s. s. "State of Nebraska," in N. 47° 24', W. 47°, passed an iceberg.

6th.—Ship "Dora," in N. 48° 56', W. 48° 38', passed two very large icebergs about two hundred feet high, also several small pieces from twenty to forty feet high.

7th.—Ship "Dora," in N. 48° 20', W. 48° 35', passed six very large icebergs ranging from about one hundred to five hundred feet high.

8th.—S. S. "State of Georgia," in N. 48° 31', W. 46° 40', passed an iceberg and several small pieces.

9th.—S. S. "State of Georgia," in N. 47° 8', W. 51° 14', passed two icebergs.

10th.—S. S. "Lake Huron," in N. 48° 50', W. 49° 10', passed several large and small icebergs; s. s. "Gallia," in N. 43° 24', W. 48° 44', passed a large iceberg.

11th.—S. S. "City of Richmond," in N. 47° 50', W. 43° 50', passed three icebergs; also, in N. 47° 15', W. 46° 27', passed two icebergs.

12th.—Bark "Orpheus," in N. 44° 15', W. 52° 0', passed two large icebergs.

14th.—S. S. "Arizona," in N. 47° 10', W. 47° 37', passed an iceberg about fifty feet high.

16th.—Captain Gamon, commanding the s. s. "Rhodora," reported: 16th, 7 p. m., lat. 48° 14' N., long. 43° 40' W., the thermometer in the chart room fell to 48° and kept steady at that point until 9 a. m. the next day, when we passed a large iceberg in N. 47° 20', W. 47° 8'; soon after, the thermometer rose to its usual height; did not see any ice during the night, though it was clear, but no doubt other icebergs were passed. The s. s. "Azalea," in N. 47° 38', W. 45° 36', passed a large iceberg; ship "Susanne," in N. 46° 57', W. 46° 9', passed an iceberg; s. s. "Wyoming," in N. 46° 23', W. 47° 8', passed a large iceberg.

17th.—S. S. "Donau," in N. 46° 28', W. 46° 4', passed an iceberg, also in N. 46° 2', W. 47° 33', passed one large and one small berg; temperature of air, 52°·7; water, 46°; ship "Susanne," in N. 46° 25', W. 47° 30', saw two large icebergs.

19th.—S. S. "Egypt," in N. 45° 43', W. 48° 9', passed an iceberg.

20th.—S. S. "City of Berlin," in N. 46° 36', W. 45° 43', passed an iceberg and several small pieces; in N. 46° 10', W. 47° 30', passed two large icebergs.

24th.—Quebec, 24th.—Several incoming vessels report heavy masses of ice in the Gulf and Strait of Belle Isle. Some of the oldest mariners cannot recollect having encountered so much ice before at this time of the year.

27th.—Captain Dale, commanding the s. s. "Brooklyn" reported: Passed numerous icebergs and detached pieces from

Belle Isle eastward; last ice was seen in N. 52° 50', W. 50° 20'.

Saint Johns, N. F., Sept. 3d.—One hundred and forty-five icebergs lie between Wadham's Island and Trinity Bay, Newfoundland.

The "New York Maritime Register" of September 17th, publishes the following:

Three hundred and nineteen icebergs are now drifting southward between Cape Freels and Cape Race.

TEMPERATURE OF THE AIR.

[Expressed in degrees, Fahrenheit.]

The distribution of mean temperature over the United States and Canada for August, 1884, is exhibited on chart ii. by the dotted isothermal lines; chart v. shows the departures from the normal.

On the Pacific coast; in the northern plateau; northern New England; and from southwestern Texas to Arizona, the mean temperature for August, 1884, is slightly above the normal, the departures being greatest in the north Pacific coast region. In all other parts of the United States the mean temperatures are normal or below. The greatest departures below the normal are shown over an area extending eastward from Wyoming and Colorado to the Mississippi river, where they are from 4° to 6°. Over the country north of the thirty-fifth parallel of latitude and between the eighty-fifth meridian and the Rocky mountains, the departures below the normal temperature are from 2° to 5°.

In the following table are shown the normal temperatures for the month of August for a series of years; the mean temperatures for August, 1884, and the departures from the normal for each of the several geographical districts, as deduced from the records of the Signal Service:

Average temperatures for August, 1884.

| Districts. | Average for Aug. Signal-Service observations. | | Comparison of Aug., 1884, with the average for several years. |
|----------------------------------|---|-----------|---|
| | For several years. | For 1884. | |
| | 0 | 0 | 0 |
| New England..... | 67.9 | 67.6 | 0.3 below. |
| Middle Atlantic states..... | 73.6 | 73.2 | 0.4 below. |
| South Atlantic states..... | 78.7 | 77.2 | 1.5 below. |
| Florida peninsula..... | 82.4 | 81.6 | 0.8 below. |
| Eastern Gulf states..... | 79.4 | 78.3 | 1.1 below. |
| Western Gulf states..... | 81.5 | 80.2 | 1.3 below. |
| Rio Grande valley..... | 82.7 | 82.2 | 0.5 below. |
| Tennessee..... | 77.0 | 75.2 | 1.8 below. |
| Ohio valley..... | 74.9 | 73.1 | 1.8 below. |
| Lower lake region..... | 69.7 | 67.9 | 1.8 below. |
| Upper lake region..... | 66.9 | 64.4 | 2.5 below. |
| Extreme northwest..... | 66.4 | 64.4 | 2.0 below. |
| Upper Mississippi valley..... | 74.1 | 70.9 | 3.2 below. |
| Missouri valley..... | 73.5 | 69.5 | 4.0 below. |
| Northern slope..... | 67.6 | 65.3 | 2.3 below. |
| Middle slope..... | 73.2 | 70.4 | 2.8 below. |
| Southern slope..... | 76.8 | 75.1 | 1.7 below. |
| Southern plateau..... | 79.2 | 78.5 | 0.7 below. |
| Northern plateau..... | 68.9 | 71.8 | 2.9 above. |
| North Pacific coast region..... | 63.4 | 66.8 | 3.4 above. |
| Middle Pacific coast region..... | 70.1 | 70.9 | 0.8 above. |
| South Pacific coast region..... | 76.2 | 76.6 | 0.4 above. |
| Mount Washington, N. H..... | 47.2 | 47.7 | 0.5 above. |
| Pike's Peak, Colo..... | 39.0 | 35.0 | 3.4 below. |
| Salt Lake City, Utah..... | 75.3 | 72.6 | 2.7 below. |

The following are some of the highest and lowest monthly mean temperatures reported from the Signal Service stations:

| Stations reporting highest. | Stations reporting lowest. |
|----------------------------------|--|
| Key West, Florida..... 83.9 | Pike's Peak, Colorado..... 0 |
| Galveston, Texas..... 83.8 | Mount Washington, New Hampshire..... 47.7 |
| Phoenix, Arizona..... 83.7 | Cape Mendocino, California..... 56.0 |
| Wickenburg, Arizona..... 83.4 | Port Angeles, Washington Territory..... 58.1 |
| Rio Grande City, Texas..... 83.2 | Fort Bridger, Wyoming..... 58.7 |
| New Orleans, Louisiana..... 82.3 | San Francisco, California..... 58.7 |
| Indianola, Texas..... 81.9 | Pysht, Washington Territory..... 59.1 |
| Red Bluff, California..... 81.5 | Fort Stanton, New Mexico..... 59.4 |
| Brownsville, Texas..... 81.3 | Fort Maginnis, Montana..... 60.8 |
| Cedar Keys, Florida..... 81.2 | Eastport, Maine..... 61.0 |
| Fort Concho, Texas..... 81.2 | Saint Vincent, Minnesota..... 61.7 |
| Fort Thomas, Arizona..... 81.0 | Alpena, Michigan..... 62.0 |
| Shreveport, Louisiana..... 80.2 | Mackinaw City, Michigan..... 62.2 |